bacilli, and indicates that the prevention and cure are to be effected by removal of conditions favourable to their life and development. Mortar should be mixed with germicides, as coal-tar, sulphate of copper, &c., and where disease of the walls exist, the cure should be effected by inoculation of the walls with anti-nitrifying bacilli.

NOTES.

THE Council of the Institution of Civil Engineers have made the following awards for papers read and discussed before the Institution during the past session:—Watt medals and premiums to Prof. H. L. Callendar, F.R.S., and Mr. J. T. Nicolson; a Telford medal and premium to Mr. A. H. Preece; George Stephenson medals and premiums to Messrs. Whately Eliot and W. O. E. Meade-King; a Crampton prize to Mr. E. W. Anderson; Telford premiums to Messrs. L. B. Atkinson, Henry Fowler, and W. L. Strange. The presentation of these awards, together with those for papers which have not been subject to discussion and will be announced later, will take place at the inaugural meeting of the next session.

THE Reception Committee of the Fourth International Congress of Zoology have issued a circular containing particulars with regard to lodgings and other accommodation at Cambridge during the meeting in August next, and giving information as to the railway fares from various parts of the Continent, and other arrangements for the Congress. The circular is accompanied by a reply-form, to be filled up and returned to the Secretaries by any member of the Congress who wishes rooms to be taken for him. These circulars have been sent to all who have already informed the Reception Committee that they hope to be present at the meeting, and will be sent to other zoologists on application to the Secretaries of the Reception Committee, The Museums, Cambridge.

THE Select Committee appointed to inquire into and report upon the administration and cost of the Museums of the Science and Art Department have agreed to the following preliminary report:—Since the issue of the report of the Museums of the Science and Art Department Committee in July 1897, your Committee have continued the inquiry, but reserve for a further report the publication of additional evidence with their final review and recommendations. They feel, however, bound to report without delay certain conclusions at which they have arrived, on consideration of the evidence, as regards the South Kensington Museum and the Geological Museum in Jermyn Street. They are unanimously of opinion that with a view to present efficient management, to economy of administration, to future development of the collections, and to their full use for the purpose of exhibition and of instruction, it is necessary—(1) That the whole area on the east side of Exhibition Road (except that occupied by the Royal College of Science, which cannot be sacrificed except at great cost) be exclusively devoted to the Art Museum and the Art Library, with provision for the conduct of the business connected with Loans of Art Objects, and the Art Schools. They are satisfied that the whole of this space is required for the Art Schools, the due exhibition of the Art Collections, and the administration connected with such a museum. (2) That provision for the whole of the Science Collection, the Science Library, for Loans of Scientific Objects, and for the Science Schools be made on the west side of the Exhibition Road. They are convinced that this concentration of Art on one side of the road and of Science on the other is essential to good administration, to satisfactory results from the money expended, and efficiency both in the museum and in the schools. This arrangement would allow space for the future development both of the Art and of the Science branches. They also unanimously recommend that the Geological Museum in Jermyn Street be no longer occupied for the same purposes as now; and that the collections there exhibited be removed to the west side of Exhibition Road, and made part of the Science collections.

THE address of the British Institute of Preventive Medicine is now Grosvenor Road, London, S.W., instead of Great Russell Street, London, W.C.

THE death is announced of M. Demontzey, Correspondant of the Section of Rural Economy of the Paris Academy of Sciences.

WE regret to notice the announcement of the death of Dr. Samuel Gordon, president of the Royal Academy of Medicine in Ireland, and successor to the late Dr. Haughton as president of the Royal Zoological Society, Dublin.

AT the Royal Institution on Thursday, May 12, Lord Rayleigh will deliver the first of a course of three lectures on "Heat," and on Saturday, May 21, Mr. J. Arthur Thomson will begin a course of two lectures on "The Biology of Spring." The Friday evening discourse to-morrow is by Mr. E. A. Minchin, whose subject is "Living Crystals."

THE death is announced of Dr. Karl Ludwig Fridolin von Sandberger, who until recently was Professor of Mineralogy and Geology in the University of Würzburg, and Director of the Mineralogisches Institut. Although known for his many important contributions to mineralogical science, to the study of ore deposits and to the microscopic structure of eruptive rocks, he was likewise distinguished for his researches on the fossil Mollusca of various formations in the Rhenish provinces and other parts of Germany. His published works date back to 1847. During the years 1850–56 he issued, in conjunction with his brother Dr. Guido Sandberger, "Die Versteinerungen des rheinischen Schichten-systems in Nassau"—a work remarkable for the beauty of its illustrations and the fidelity of its descriptions, and one which was honoured by the award of the Wollaston Fund, which was given to the authors by the Council of the Geological Society in 1855. In 1863 Dr. Fridolin Sandberger published "Die Conchylien des Mainzer Tertiärbeckens"; in 1870–75 he issued, in two volumes, "Die Land-und Süsswasser-Conchylien der Vorwelt"; and in 1882–5, "Untersuchungen über Erzgänge," an authoritative work on the subject of mineral veins. In the course of his long labours he turned his attention to the Mollusca of many different formations, from those of Devonian age to those of Pliocene and Pleistocene deposits. In later years his work became more concentrated on mineralogical science. In 1875 he was elected a Foreign Member of the Geological Society of London. He was born in 1826, and died at Würzburg on April 11.

MR. W. J. LEWIS ABBOTT sends us the following particulars concerning the career of Mr. Henry Lewis, who died on April 10, at the age of sixty-four:—Though apprenticed to a bootmaker, throughout his early life Lewis spent much of his time in the pursuit of natural history subjects, and thirty years ago was led to the subject of flint implements, and forthwith became one of the most ardent collectors. For many years weekly visits were made to pits in the Thames Valley, in each of which he set workmen hunting. He also successfully worked the Botany Bay section, securing much more material than Skertchley, consisting of worked flakes as well as finished implements. His next work was upon the plateau, where he secured valuable spoil. For the last ten years he visited the glacial and preglacial deposits in search of worked flints and implements glacially striated and otherwise, and accumulated a mass of material at present undescribed. His late Celtic discoveries at

Aylesford were of singular interest and importance, and were described by Mr. Arthur Evans before the Society of Antiquaries. A large amount of material obtained by him still waits description. But, after all, it is this collection of material which is so indispensable and important; and hence great credit is due to Henry Lewis for the part he played in unravelling the secrets of prehistoric anthropology.

THE sixty-ninth anniversary meeting of the Zoological Society of London was held on Friday last, the chair being taken by Sir William H. Flower, K.C.B., F.R.S., President of the Society. Mr. P. L. Sclater, F.R.S., read the report of the Council, from which it appeared that the occurrence of the Queen's Diamond Jubilee in 1897, together with the very favourable weather experienced during the summer and autumn of that year, resulted in a large number of visitors to the Society's gardens, and the total income of the Society consequently reached the large amount of 28,713*l.*, being 1631*l.* more than in 1896, and greater than that of any year since the year 1884. The principal new building opened in the Society's gardens in 1897 was the new ostrich and crane-house, which was commenced in the autumn of 1896. During the past summer, also, a new glass-house for the reception of the Society's collection of tortoises was built, adjoining the reptile-house. The Council referred to the loss sustained by the death of Mr. A. D. Bartlett, for thirty-eight years superintendent of the Society's gardens, and recorded their deep sense of the services rendered by him during the long period he held his post. The vacancy thus caused has been filled up by the appointment, as superintendent, of Mr. Bartlett's second son, Mr. Clarence Bartlett. The number of visitors to the gardens in 1897 was 717,755, being 52,751 more than the corresponding number in 1896. The number of animals in the collection on December 31 last was 2585, of which 792 were mammals, 1362 birds, 431 reptiles and batrachians.

WE learn from the thirty-first annual report of the Peabody Museum of American Archæology and Ethnology, that Miss Maria Whitney has made a gift of great scientific interest from the estate of her brother, the late Prof. J. D. Whitney. This consists of the world-famous "Calaveras skull" and all the original documents relating to its discovery and history; with the gravel, small human bones, and other objects found in the cemented débris in which the skull was enclosed at the time of its discovery, as shown by the photograph taken before the cemented material was removed. With these are also a rude stone mortar, stone pestle and steatite dish, found under similar geological conditions in California. The full history of the discovery of the skull by Mr. Mattison, in 1866, under four beds of lava in a shaft he had sunk to the depth of 127 feet, is given in Prof. Whitney's volume on the "Auriferous Gravels of California," published in 1879 as vol. vi. of the *Memoirs* of the Museum of Comparative Zoology. When taken in connection with other discoveries under similar geological conditions in California, there seems to be no reason to doubt that these human remains were found in the gravel under the lava, as stated by Mr. Mattison. The principal question still in doubt is the exact age of the lava beds and gravels. The skull itself, so far as can be judged by a comparative study of the portion preserved, is of the type which there are reasons for regarding as the oldest on the Pacific coast. The objects, fashioned by the hand of man, found in the gravel, have been considered by some authors to be of a character too advanced in the development of the arts of man on the American continent to have come from so old a deposit. It is pointed out, however, that one cannot apply to American archæology the old classification of the culture epochs which, during the growth of science, has been used to distinguish several periods of prehistoric culture in Europe. In addition to Miss Whitney's valuable gift, the Museum received during the past year a number of other objects of scientific importance, including gifts from friends and collections made by expeditions to Yucatan and Honduras. A description of some of the results of archæological explorations in Central America and Yucatan recently appeared in these columns (p. 568).

THE Deutsche Seewarte has rendered a valuable contribution to meteorology by the publication of means for the ten years 1886–1895, based upon the observations made three times daily at nine stations connected with that institution. Dr. Neumayer has always carefully adhered to the regulations made by the various meteorological conferences, and the present work, which continues the means previously published for the years 1876–1885, contains monthly, seasonal, and annual values and extremes made with trustworthy instruments and trained observers.

SINCE 1882, the Royal Meteorological Institute of Utrecht has published a yearly volume relating to the thunderstorms and optical phenomena observed in the Netherlands. The number of stations at which thunderstorms are observed is 254; the days on which storms were recorded amounted to 119 during the year 1897. With the exception of the months of January and February, during which no thunderstorms were observed, they were regularly distributed throughout the year. The report contains a discussion of the storms in each month, and is accompanied by various charts.

A VERY useful feature which is being introduced into Russian schools is the sending out of the pupils in summer for small natural science and ethnographic excursions, during which they explore some region and make all sorts of collections and observations. The Caucasus School administration is especially active in that direction. One such excursion will be made to the foot of the Elbrus this summer by fifty pupils of the Ekaterinodar Gymnasium. The party intends to visit the Great Karachai region, to ascend the Elbrus up to the snow-line, and to cross the Main Ridge. The excursion will last fifty days, during which the pupils will collect natural history specimens and ethnographical data, take photographs, sketch landscapes, and live amidst the beautiful pine forests of the Main Caucasus ridge. Some of the boys will take musical instruments with them to enliven the party.

A JOINT expedition of the West Siberian branch of the Geographical Society and the Moscow Society of Amateurs of Natural Sciences will this summer explore the hydrography and the fauna of the lakes in the South of Omsk. The collections will be divided between the two Societies.

PROF. J. TROWBRIDGE, Rumford professor of the application of science to the useful arts, Harvard University, describes in the *Century Magazine* some experiments he made with a view to determining the nature of Röntgen rays. He concludes as follows:—"I believe that the experiments which I have described support the theory that there are really two classes of phenomena—one an electrical disturbance in a medium, another the conversion of this electrical disturbance into fluorescent and phosphorescent light at the surfaces of suitable screens or in the body of suitable crystals. My experiments certainly show that there are anode rays as well as kathode rays, and that both are subject to the well-known laws of electrical induction. One should not expect, therefore, that the electrical rays or lines of force should be reflected and refracted like waves of light."

SOME interesting properties of Röntgen rays were recently described by Prof. Röntgen in a communication to the Berlin Academy of Sciences, and are summarised in the *Electrical*

World. If a fluorescent screen is protected from the direct action of rays emitted by a tube, by means of an opaque plate, a slight fluorescence is nevertheless seen when the tube is in action. Röntgen has now shown that this is due to the fact that the air around the tube gives forth X-rays. The brightness of a screen illuminated with rapidly intermittent rays depends on a number of properties which he enumerates. The X-rays from a platinum focus plate which are most active for showing images are those which leave the plate at the greatest angle, but not much greater than 80°; thick plates have a relatively larger transparency than thin ones, that is, the specific transparency of a body is greater the thicker the body; the same body has different transparencies with different tubes, "soft tubes" being those requiring a small potential, and "hard tubes" those requiring a high one. The quality of the rays from the same tube depends on: the way in which the interrupter works, the insertion of a Tesla transformer, the vacuum, other processes in the tube which are not yet fully investigated. The smallest pressure at which X-rays are produced is very likely below 0·0002 mm. of mercury. The composition of the rays from a platinum anode depends largely on the element in the current; the quality of the rays does not change with changes of the primary current, or at least very little, but the intensity is proportional to the strength of the primary current between certain limits. The following conclusions are stated: the radiation consists of a mixture of rays of different intensity and absorbability; the composition depends greatly on the time element in the current; the rays produced by the absorption of bodies are different for different bodies; as X-rays are produced by kathode rays, and as both have common properties, it is probable that both processes are of the same nature. If two screens are illuminated with two tubes of different hardness, the illumination being made equal, and if then replaced by photographic plates, the one illuminated by the harder tube will be blackened much less than the other; rays which produce equal fluorescence can be photographically quite different; the usual photographic plates are very transparent for X-rays (in a pile of ninety-six filaments exposed for five minutes the last one showed photographic action); the eye is not entirely passive to X-rays.

PROF. LOUIS BOUTAN, lecturer on zoology at the Sorbonne, contributes to the *Century Magazine* (May) an account of his experiments in submarine photography. To procure photographs under water, Prof. Boutan uses a camera enclosed in a water-tight case, a blue glass being arranged in front of the lens to suit the conditions of submarine illumination, and so give a picture having pleasing contrasts. He descends under water in a diver's costume, and the camera is sent down to him from an anchored boat. The spot to be photographed is then selected, and the exposure is made in precisely the same way as on land. When no artificial light is used, submarine photographs require a rather long exposure, the time often extending to twenty-five minutes, and depending upon the depth of the water. Four reproductions of photographs obtained at depths from six and a half feet to sixteen and a half feet, accompany Prof. Boutan's article, and they are sufficient to show that submarine photography can produce useful results. It is estimated that not more than one hundred square metres of area can be photographed under water, but even with this limitation the pictures obtained will contain more valuable information than divers can furnish. The problem to be solved is to construct an apparatus which will take photographs in artificial light in any depth of water without needing a submarine photographer to manipulate it.

THE immunity of bee-keepers from the effects of bee-poison, forms the subject of a paper, by Dr. Langer, read before the sixty-ninth Congress of German Naturalists and Physicians in Brunswick. The author sent circulars to all parts of the country addressed to bee-keepers, and from the answers he received he has compiled some interesting statistics. One hundred and forty-four bee-keepers stated that they were immune to the sting of bees, nine mentioning that they were naturally immune to the poison, whilst twenty-six replied that they could not acquire immunity. The number of bee-stings necessary to produce the much-desired immunity appears to vary considerably, sometimes thirty being sufficient, but in other cases as many as 100 being necessary to accustom the system to the poison. The remedies applied range over a large variety of substances, and include tobacco juice, French brandy, rum, water, spirits of ammonia, seltzer water, acetate of alumina, loam, saliva, cognac, besides massage and heat. The most favourite means of dealing with bee-stings appears to be spirits of ammonia. Dr. Langer states that a 5 per cent. solution of permanganate of potash will counteract the poison, and he recommends an injection of a 2–5 per cent. solution of this substance. Bee-poison is extraordinarily resistant to both dessication and heat, whilst it is quite unaffected by additions of alcohol. It used to be commonly supposed that the irritating nature of bee-poison was due to the presence of formic acid; but inasmuch as it can withstand heat and retain its poisonous activity, which would effectually volatilise the formic acid were it present, this idea must be abandoned. The opinion now appears to be that the toxic substance present partakes of the nature of an alkaloid.

A COPY of the Act of Incorporation, bye-laws, and list of officers of the recently-established Washington Academy of Sciences has been sent to us. The particular business and objects of the Academy are stated to be the promotion of science, with power to acquire, hold, and convey real estate and other property, and to establish general and special funds; to hold meetings; to publish and distribute documents; to conduct lectures; to conduct, endow, or assist investigation in any department of science; to acquire and maintain a library; and, in general, to transact any business pertinent to an Academy of Sciences. The Academy will act as a federal head of the affiliated scientific societies of Washington, with power to conduct joint meetings, publish a joint directory and joint notices of meetings, and take action in any matter of common interest to the affiliated societies. The term "affiliated societies" at present covers the Anthropological, Biological, Chemical, Entomological, National Geographic, Geological, Medical, and Philosophical Societies, each society nominating a vice-president. The President of the Academy is Mr. J. R. Eastman, and the Secretary Prof. G. K. Gilbert.

CURATORS of museums know that the papers read at the annual meetings of the Museums Association, and the discussions which take place upon them, are serviceable in indicating the best systems of classification and arrangement of specimens, and in evoking expert opinions upon museum technique. The Report of the proceedings of the Oxford meeting of the Association, edited by Mr. James Paton, has just been published by Messrs. Dulau and Co., and from it much valuable information can be gained by the officers of local museums. Among the contents is an address by the president, Prof. E. Ray Lankester, F.R.S., and papers on the methods of setting and labelling Lepidoptera for Museums, by Prof. E. B. Poulton, F.R.S.; the arrangement of the mineral collection in the University Museum, Oxford, by Prof. H. A. Miers, F.R.S.; the arrangement of ethnographical collections, by Mr. F. W. Rudler; popular museum exhibits, the relation of museums to elementary education, and a description of the Colombo Museum. Opinions and conclusions based upon successful experience are always valuable, therefore this report of the Museums Association will be of service not only to the organised provincial museum officer, but will also educate the curators and managers of local nstitutions of the "curiosity shop" type to a sense of their responsibilities and opportunities.

IN March 1848, Louis Agassiz began his instruction at Harvard College, and with it a new era in zoological science commenced in America. To commemorate the jubilee of his appearance as a teacher in America, the March number of the *American Naturalist*, which has only just reached us, contains a sketch of the life of Agassiz and reviews of some aspects of his work. It is peculiarly appropriate that the *American Naturalist* should take advantage of the opportunity which this fiftieth anniversary presents to pay a tribute to Agassiz's work, seeing that the periodical was founded by four pupils of that distinguished investigator—Alpheus Hyatt, Edward Sylvester Morse, Alpheus Spring Packard, and Frederick Ward Putnam. The anniversary thus commemorated is also the anniversary of a change in the character of zoological science in America, and of a change in the academic position of zoology in the educational institutions in the New World. To these changes must be ascribed the advances which American students have made in morphological science, and have gained for their country a foremost position among the nations of the earth.

FRIENDLY intercourse between men working in various fields of natural knowledge tends to broaden views and sympathies. With this aphorism in mind, and also the fact that the number of persons in the University of Durham interested in the progress of science is increasing, some members of the University met towards the end of 1896 and formed themselves into a Philosophical Society having for its principal objects the promotion of research and the communication of facts and ideas bearing upon scientific questions. The first number of the *Proceedings* of this Society has just been issued, and it is a creditable production which may, we trust, be taken as an earnest of greater things to come. Among the subjects of papers printed in the *Proceedings* are: education and instruction in England and abroad; the effect of alternating currents upon the frog's heart; native methods of fire-making; and the Great Ice-Age.

THE popular science lectures delivered on Tuesday evenings at the Royal Victoria Hall, Waterloo Bridge Road, provide a valuable means for instructing a large section of the general public in the methods and results of scientific work. The lecturers give their services, and only a few pence is charged for admission, the object being not to make the lectures commercially profitable, but to encourage interest in the pursuit of natural knowledge. After the lecture a short variety entertainment is provided, and it says much for the character of the audience that more people leave at the end of the lecture than are admitted to the entertainment. During May several distinguished men of science will lecture at the Hall. On Tuesday, Prof. Tilden delivered a discourse in which he described "What a Chemist can get out of a Brick"; on May 10, Prof. McLeod will lecture on "A Simple Experiment, and its Explanation"; Prof. Sollas will take as his subject "Funafuti, or three months on a Coral Island," on May 17; and Prof. Marshall Ward will say "Something about Wood," on May 24. The Hon. Secretary of the Hall should feel gratified at being able to offer such an attractive programme as this.

THE many subjects covered by the articles which have appeared in *Science Progress* since its commencement, and the satisfactory way in which they have usually been treated, make the volumes which have been published almost an encyclopædia of science. There are few scientific subjects of prime importance in which advances have been made in recent years but what have been dealt with by our solid contemporary, and surveyed in sufficient detail to make the volumes very serviceable to students of science. The April number of this "quarterly review of current scientific information" contains an article on Julius Sachs by Prof. K. Goebel, and one on the germination of seeds by Mr. F. Escombe. Prof. H. Crompton describes association and dissociation; Dr. T. Gregor Brodie, the phosphorus-containing substances of the cell; Dr. F. A. Dixey, recent experiments in the production of insect hybrids; Mr. A. Harker, the forms and habits of igneous rocks; Dr. J. S. Haldane, F.R.S., the secretion and absorption of gas in the swimming-bladder and lungs; and Prof. J. Reynolds Green, F.R.S., oxidases or oxidising enzymes.

THE additions to the Zoological Society's Gardens during the past week include a Mona Monkey (*Cercopithecus mona*, ♂) from West Africa, presented by Mrs. Christiana G. R. Potter; a Macaque Monkey (*Macacus cynomolgus*, ♀) from India, presented by Mrs. Burrell; a Ring-tailed Coati (*Nasua rufa*) from South America, a Mantled Buzzard (*Leucopternis palliata*) from Brazil, presented by Mr. Basil T. Freeland; a Daubenton's Curassow (*Crax daubentoni*) from Venezuela, presented by Mr. Emil A. Goeldi; two Silver-bills (*Munia malabarica*) from India, presented by Lady Charlotte Amherst; two Moorish Toads (*Bufo mauritanica*) from North-west Africa, presented by Mr. D. P. Turner; a Humboldt's Lagothrix (*Lagothrix humboldti*, ♀) from the Upper Amazons, two Beautiful Grass Finches (*Poëphila mirabilis*) from Australia, two Yellow-legged Herring Gulls (*Larus cacchinnans*) from Egypt, twelve Midwife Toads (*Alytes obstetricans*), European, purchased; a Californian Sea Lion (*Otaria californiana*) from California, received in exchange; four Barbary Wild Sheep (*Ovis tragelaphus*), a Grey Ichneumon (*Herpestes griseus*), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

COMET PERRINE (MARCH 19).—The ephemeris of this comet for the ensuing week is as follows:—

12h. Berlin Mean Time.

1898.	R.A.	Decl.	Br.
	h. m. s.	° ′	
May 5	0 58 43	+52 18·3	0·46
6	1 4 9	52 38	
7	9 35	52 56·9	
8	15 0	53 14·7	0·42
9	20 24	53 31·5	
10	25 46	53 47·4	
11	31 6	52 2·4	
12	1 36 25	+54 16·3	0·38

TEMPEL'S COMET (1867 II.).—M. Gautier publishes (*Astr. Nach.*, No. 3490, Beilage) an ephemeris of this periodic comet, which was discovered by Tempel at Marseilles in 1867. The comet has a period of about 6·5 years, and it was observed at its returns in 1873 and 1879, but since that time has not been seen, although two returns have been due. M. Gautier, who has interested himself in this comet, calculated that the last return ought to have occurred in 1892, owing to the perturbating action of Jupiter on its orbit. If this be so, then probably we should expect its return during the present year. The region of the sky which should be swept for picking up this object is, according to M. Gautier, for the present week between R.A. 11h. 20m. and 11h. 43m., and between Declinations +16° 46′ and +18° 7′.

KIRCHHOFF'S SPECTROSCOPE.—The Potsdam Astrophysical Observatory has just become possessed of the celebrated spectroscope which Kirchhoff used in his well-known investigations on the solar spectrum. Although this instrument has been previously described, detailed information on several points connected with it was lacking. To remedy this Prof. H. C. Vogel brings together (*Sitzungsberichte der Königlich Preussischen Akademie der Wis.*, *Berlin*, February 1898) such information as is supplementary to that already known, obtaining his facts from a minute examination of the instrument itself. As regards the